

# **Total Factor Productivity in China: Current Conditions, Problems, and Policy Solutions**

by

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# **Total Factor Productivity in China: Current Conditions, Problems, and Policy Solutions<sup>§</sup>**

**Liu Mingkang<sup>1</sup>**

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## **1. Total Factor Productivity in China**

In the wake of the reform and opening-up policy of 1978, China has experienced an unprecedented period of rapid economic development. The average annual growth rate of China's real GDP has remained above 9% in the first three decades of the policy—a feat of sustained, rapid growth.

However, since 2012 real growth rates have witnessed a slowdown, falling to 7.7% in 2012 and 2013, and lower still to 7.4% in 2014, and roughly 6.9% in 2015. Will the Chinese economy be able to transition into a slower-growing, more stable “new normal”? Or will it fall into the “middle income trap”? The direction China's economy ultimately takes will not depend on short-term stimulus policies but on whether the country can achieve sustainable total factor productivity growth.

In traditional economic analysis, inputs such as labour and capital are used to generate output. More output can be generated by either increasing the amount of inputs used or by using the same inputs more effectively. In the case of the latter, total factor productivity (TFP) is a measure of how efficiently inputs are used. A large number of empirical studies have shown that economic growth obtained purely through increasing

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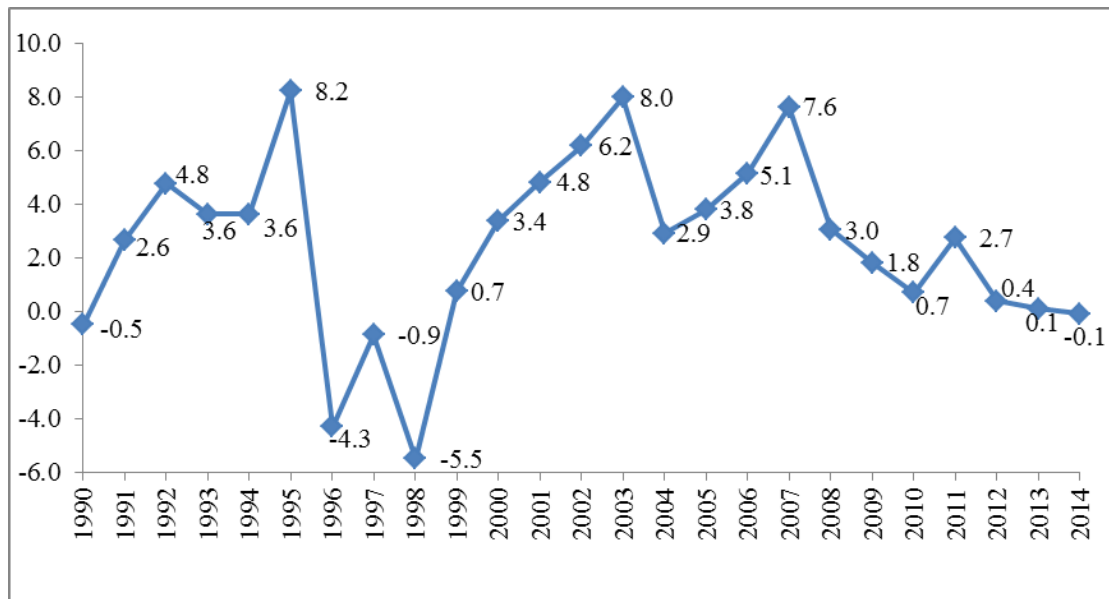
<sup>1</sup> BCT Distinguished Research Fellow at Lau Chor Tak Institute of Global Economics and Finance of The Chinese University of Hong Kong, Distinguished Fellow at the Asia Global Institute of the University of Hong Kong, Honorary Dean of the Lingnan (University) College of Sun Yat-Sen University, and Former Chairman of the China Banking Regulatory Commission. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the Institute.

factor inputs cannot be sustained. The key to driving economic growth is through sustained TFP growth.

At the beginning of the reform and opening-up period, China possessed an abundance of cheap labour and natural resources. Simply increasing the usage of factor inputs alone allowed the economy to achieve rapid growth rates. However, as more workers move from farms to urban factories, the availability of cheap, leftover agricultural labour is declining. Combined with reducing resource availability and widespread environmental pressures, economic growth is slowing, indicating that the previous, extensively factor-driven growth model is becoming unsustainable. To maintain sustainable growth for now and the future, TFP growth is key.

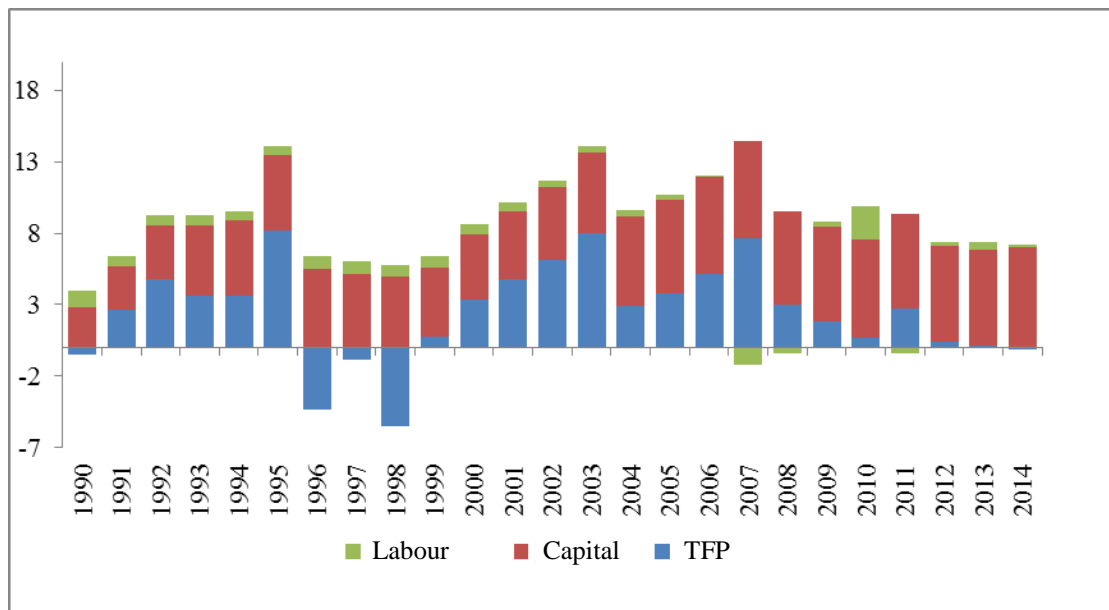
However, recent trends in TFP growth have not been optimistic. In the wake of Deng Xiaoping's landmark southern tour and the economic liberalisation that followed, TFP grew steadily in the early 1990s. Its strong growth was offset several times, first by industrial reform and the Asian Financial Crisis in the mid-1990s, then by the outbreak of SARS in 2003. TFP growth rates began to fall consistently after the global financial crisis of 2008, and with it fell its contribution to economic growth. Though TFP growth in most of the major economies rebounded quickly after the crisis, the downward trend of China's own TFP growth remained. In 2013, TFP growth was close to zero, and in 2014 it shrunk by 0.1%. Stopping the decline of TFP and turning it into a key driver of economic growth should and must become a top priority for economic policy in the coming years.

**Figure 1: China's TFP Growth Rate, 1990–2013 (%)**



Source: TED, Conference Board

**Figure 2: Labour, Capital and TFP Contributions to Economic Growth, 1990–2013**



Source: TED, Conference Board

## **2. Existing and Potential Contributors to TFP Growth**

Reversing the declining trend in TFP requires a close examination of its contributing sources. There are two ways to increase TFP—the first is to improve the efficiency of resource allocation, and the other is through technological progress.

Improving the efficiency of resource allocation means allocating more resources to productive firms. Holding technological levels constant, productive firms with access to more resource inputs result in higher output and greater potential to develop more advanced production techniques. This process of resource allocation can occur both between industries and within industries. In the case of allocation between industries, this tends to occur alongside occurrences of technological change, with the size of the reallocation depending largely on how well-developed the country's economy is. Resource allocation within industries occurs between firms, and its influence on TFP depends on the state of the country's institutions, as well as the efficiency of its markets.

Technological progress improves TFP by utilizing more advanced technology in the production process, allowing more output to be produced for a given amount of inputs. This can be achieved in two ways—through independent research and development (R&D), or through importing technology and ideas. For less technologically advanced countries, importing more advanced, foreign technologies and know-how can be an efficient and cheaper way of catching up, whilst avoiding the high costs associated with R&D. For countries at the frontiers of technology, on the other hand, R&D is of greater importance.

Within this framework, there are several possibilities open to the Chinese economy for improving TFP growth.

*1. Unless China can make better use of new technologies, there is limited room for TFP growth through resource allocation between industries.*

As a country in transition, China's low starting level of industrialisation and distorted industrial structure have been the low-hanging fruit driving earlier TFP growth. We estimate that prior to 2005, resource allocation between industries was able to contribute about 10–20% to TFP growth.

However, as a result of rapid economic growth, costs have risen across all economic sectors, regardless of whether there have been commensurate increases in productivity or not. This phenomenon, known as “Baumol's disease”, has resulted in decreasing contributions from inter-industry resource allocation to TFP—from 2006, its contribution fell to about 5% of TFP growth. Since 2011, its contribution has become negative, indicating its limited and declining influence on TFP growth.

To address this, new technologies such as the internet, big data and cloud computing (including blockchain) can be used to develop new industries and revitalize existing ones in the process contributing towards TFP.

*2. There is still significant scope for TFP growth through resource allocation within industries.*

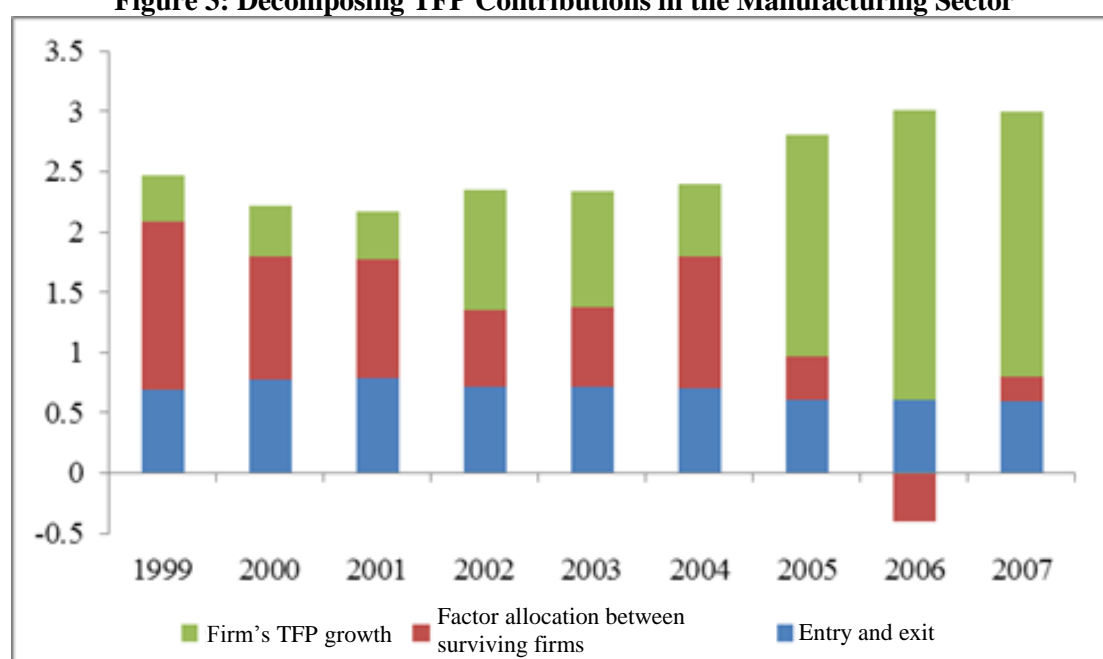
As a result of institutional obstacles, resource allocation within industries in China is still far from effective. National policy grants inefficient and poorly performing state-owned enterprises preferential and cheaper access to resources, meaning that they are still able to operate in markets where they would have otherwise been forced to exit. As a result, some more efficient and better performing non-state-owned firms struggle because of difficulty accessing resources. This is a common phenomenon in many industries.

In the manufacturing sector, from 2005 onwards the contribution of intra-industry resource allocation to TFP growth dropped sharply. This was largely due to the overexpansion of inefficient projects and large enterprises, and a resultant underperformance by small private firms. With this, large enterprises were able to claim

a larger share of resources, resulting in an overall decline in the efficiency of resource allocation.

Further deepening market reforms would help break down unfair advantages and would help guarantee that state-owned enterprises and private firms alike receive equal treatment in the market. In this way, allowing market forces to play a dominant role in allocating resources would in itself result in considerable contributions towards TFP growth.

**Figure 3: Decomposing TFP Contributions in the Manufacturing Sector**



Source: National Database of Manufacturing Firms

*3. The benefits of importing foreign technology are decreasing, while independent R&D can still provide significant contributions to TFP growth.*

At the beginning of the reform and opening-up period, China's technological levels lagged far behind those of the advanced economies. "Latecomer's advantage" allowed China to achieve huge economic gains through importing foreign technology. However, as China's own technological levels improve, the benefits to TFP growth from importing foreign technology are diminishing.



As a result, independent R&D is becoming an increasingly important contributor to TFP growth. While global trends in information technology present China with opportunities to stimulate TFP, numerous problems in domestic R&D still exist. Total R&D investment is large but is mostly channelled towards scientific research institutions and universities. In these, only a small portion of efforts are directed towards practically improving productivity. Statistics show that only 1.39% of domestic firms engage in independent R&D, far below the world average.

Encouraging more firms to engage in R&D as well as transforming the results of academic R&D into practical efforts are ways to boost TFP growth.

### **3. Further Policy Suggestions to Promote TFP Growth**

To increase TFP and to move towards a more sustainable form of economic growth, no effort should be spared in allocating resources more efficiently and strengthening R&D. To achieve these goals, we propose the following policy recommendations.

#### *1. Continue to deepen economic reforms and continue to manage the relationship between the government and the market*

Inefficient resource allocation in China is an issue that largely emanates from economic institutions, and currently the largest institutional challenge is dealing with the relationship between the government and the market.

On this issue, China should look to the direction set forth during the Communist Party's Third Plenum of 2013, which set forth the decisive role the market ought to play in allocating resources. The government's domestic interventionism should be abandoned, and its role limited to the provision of public goods and services, as well as the maintenance of institutions that guarantee the proper functioning of markets.

Efforts should be made to ensure that markets are allowed to operate efficiently—ensure that healthy competition can occur, dismantle monopolies, and even the playing field between state-owned and non-state-owned firms. Only by

ensuring that market forces are able to freely and fairly operate will resources be most efficiently allocated across the economy and productivity growth be promoted.

### *2. Emphasise economic efficiency as a goal for government officials*

The Chinese government plays a very important role in economic development, as the implementation of central government policies depends largely on government officials. Consequently, implementing policies that look to increase TFP require coordination between officials at multiple levels.

The view that GDP is the target that should be maximised at all costs should be discouraged. Officials should instead be encouraged to think along the lines of maximising economic efficiency, thereby ensuring that economic growth and development occur on more sustainable lines.

This mentality should be reflected in the criteria used to assess the performance of government officials. Where criteria previously focused exclusively on GDP, new criteria should instead focus on indicators of economic efficiency. Concerning this, the Singaporean policy of 1–2% annual TFP growth could be used as a similar metric for Chinese officials. Placing TFP growth at the core of their considerations will help officials develop better incentives and policies for long-term, effective growth.

### *3. Promote entrepreneurship and further optimise resource allocation*

As China moves further away from the era of centralised economic planning, entrepreneurs will play an important role in China's hopes of lifting TFP growth. Being participants directly engaged in economic activity, their experience and exposure to market information make them better judges of economic trends than government officials. Their skills and profit-making incentives also make them better at judging promising investment opportunities.

These characteristics help ensure that entrepreneurs are more efficient in their investments and as such should be the economic entities that help drive the optimal

allocation of resources. The government should strive to promote entrepreneurship and create the institutional conditions that allow entrepreneurs to play their crucial role in economic development.

China should promote the opening up of regulated industries and remove discriminatory policies. As part of this, the government should address “glass door” problems, where policies are announced but never implemented, and “revolving door” problems, where firms are restricted access. Government and economic institutions should enable entrepreneurs to focus on running their businesses. Ensuring that laws and policies are aligned, continuous, transparent, predictable, and reliable will spur economic and innovative activity.

Simultaneously, mechanisms for market exit, such as laws on personal bankruptcy and personal guarantees, need to be conscientiously implemented and strictly enforced.

*4. Create a good social environment for economic development through an improved income distribution system and equal opportunities for all economic sectors*

Economic development and enhancing TFP both require a good social environment. To do this, the government should further improve its system for income redistribution and should emphasise the provision of fairness to all members of society. Those with low income should have guaranteed social security, economic development should look towards expanding the size of the middle-income class, and those with high income should have their income properly adjusted.

Rather than relying simply on market forces, wealth redistribution through government action should be the primary tool for creating a socially equitable distribution. Further to this, the government should use policies and cultivate values of charitable giving to encourage voluntary redistribution of wealth. Policy must be designed and implemented carefully so as to not reduce incentives to work and innovate.

In addition to wealth redistribution, the government should place greater emphasis on creating equal opportunities for the disadvantaged to access education and employment. This will help create better social mobility among China's working classes.

*5. Promote tax reform, conduct a structural tax cut, reduce tax burdens, and minimise tax distortions*

The turnover tax system currently forms the core of China's taxation system, where combinations of a consumption tax, value-added tax or business tax are levied on all stages of the supply chain, from production to sales. Despite efforts from 2012 to reform this tax regime, taxes are still prone to cause overburdening, being repeatedly applied, and being unbalanced. This is detrimental to both TFP levels and social equity.

In response, the government should conduct structural reform of the tax system, by gradually moving away from the turnover tax, in the direction of an income tax. This would reduce the total tax burden while eliminating discrepancies in tax. Only in this way can resources be more efficiently allocated whilst preserving the incentives for individuals to innovate and produce.

*6. Provide more efficient physical infrastructure to support economic development*

Over the last 20 years, the Chinese government has placed increasing emphasis on the quality of the nation's physical infrastructure and cracked down on poor construction. However, China's infrastructure still faces issues of relatively poor construction quality, low usage, and the existence of duplicated and redundant projects. These are all barriers to improving economic efficiency and TFP growth.

Infrastructure planning and policy at all levels of government should be conducted from the perspective of economic efficiency and not from opportunities for political gain. Projects should be geared towards providing long-term social welfare that promotes sustainable and healthy economic growth. One such opportunity could lie in internet-enabled, "smart" infrastructure, whose connectivity could spur the development of complementary technologies, products, industries, and services.

To ensure a greater focus on efficiency, governments should look towards providing good services for the firms and investors involved in projects. This will motivate all parties involved to conduct business more efficiently, raise returns on capital investment, and stimulate productive competition. Simultaneously, construction works must be strictly regulated and supervised.

A robust cost-benefit analysis framework should be established as soon as possible to aid in the planning process. Projects should be evaluated in terms of their technical completion, economic completion, and social completion, looking respectively at the physical process of project completion, its ability to be financed over its lifetime, and its environmental and social impacts. These criteria should be evaluated and consulted amongst investors, regulators, and builders, who must all take responsibility to ensure that a project can be efficiently built and operated.

*7. Provide qualified professionals for economic development by improving education and training*

TFP growth will depend heavily on technological advancement and the quality of human capital. As such, achieving TFP growth requires qualified talents, as well as an improved education system. The country's education system should orient itself around four key principles: a solid basic education, refined tertiary education, practical technical education, and improved on-the-job education.

A shortage of qualified human capital is becoming a significant issue. Although the government's Ministry of Human Resources and Social Security has issued plans to train large numbers of secondary school graduates in occupational skills, as well as set aside significant resources to train migrant workers, the skills shortage is still a significant issue. To address this, the government should actively consider reforming the Hukou system, allowing migrant workers to move with their places of employment should their factories relocate. This would help encourage the flow of skilled labour, promote adjustments in industrial structure and capacity, and ensure that the industries can respond to the need of long-term economic development.

Moving from an economy driven by its cheap labour to one driven by the quality of its labour, China's population needs to be equipped with the necessary skills to meet the challenges of its next phase of economic development. Indeed, how much China's TFP can grow will be a good measure of the quality of its education system.

#### *8. Improve the financial system to strengthen support for the real economy*

There are several areas of key importance in the financial system that require reform. First, public financing in local governments needs to be separated from the financial industry. In particular, local government debts need to be disclosed, and local governments need to be held accountable for their own borrowing. Financing through "shadow banking" or financial institutions, which can bring about uncontrollable risk, needs to be prevented.

Second, the banking industry must continue to deepen their reforms. This needs to occur so that banks are more willing and better able to serve the financing needs of SMEs (small and medium-sized enterprises). Banks ought to develop their capacities in trade financing and trade settlement, so as to be able to better support the country's supply chain modernization efforts. Banks should actively explore different project financing models and be able to properly manage the relationship between banks, insurance companies, project legal entities, sponsors, and investors. This will allow more efficient investment in fixed assets and will no doubt help with China's efforts to transition towards a more sustainable system of economic growth.

Third, the government should actively develop the capital market, as well as the standards under which it operates. On the one hand, market infrastructure should continue to be built, particularly in areas such as IPOs, over-the-counter markets, interest and exchange rates, capital account liberalisation, and renminbi internationalisation. Markets where financial deepening is slow to occur, such as the bond market, should attract particular attention.

Regulation and supervision over these markets should be strengthened and improved, so as to ensure their smooth operation. Those who actively disrupt the

functioning of capital markets, through activities such as excessive speculation, excessive debt, inefficient capital allocation, or insider trading, should be prosecuted. On the other hand, the government should pay attention to the operation of market forces and not excessively intervene in maintaining capital market stability.

Fourth, policies encouraging financial innovation should be implemented, so as to ensure that the financial industry can adequately serve the needs of the real economy. Financial regulations should be streamlined, particularly over areas such as peer-to-peer lending and supply chain financing, where significant financial innovations occur. This will allow innovative firms and industries to better attract funding, maximise commercial opportunities, and minimise compliance costs.

China's financial markets are currently fragmented with inefficiencies. A healthy market with healthy competition will do much to help control and minimise these risks.

#### *9. Vigorously implement an innovation-driven development strategy*

Implementing an innovation-driven development strategy requires efforts across several fronts.

First, the government needs to establish a transparent and efficient administrative approval system. This is necessary to prevent business start-ups and innovation efforts from being negatively influenced by vested interests.

Second, develop policies that can support innovation in firms, so as to stimulate independent and innovative activity.

Third, strengthen databases that catalogue innovation, so that future innovative activity can be optimally conducted.

Fourth, use this database of innovation to ensure that innovation can occur in a more prominent location.

Fifth, improve the mechanism that allows the benefits to be shared amongst firms, industrial research, and university research, and reform the mechanisms in place that evaluate projects.

Sixth, improve mechanisms that integrate resources amongst innovative activities, paying particular attention to synergies and collaboration between industries, as well as information sharing.

Seventh, improve services and explore new platforms that can strengthen the support given to innovative activities.

#### *10. Reform the way technology is imported, and import it in new ways*

China should look towards importing technologies from more developed countries, so as to boost its own developmental abilities.

Previously, advanced technologies could be imported into China through FDI and international trade, via collaborative projects, commodities, and skilled migrants. Moving forwards, China should look to directly importing professionals skilled in science and technology. Building a good environment is important in attracting foreign talents to work and start up businesses in China.

Simultaneously, Chinese talents should be provided opportunities to study abroad or to start up their own businesses in more advanced economies. This will allow them to learn and absorb better technological know-how, which they can then bring back and contribute to China's TFP growth. In this regard, the government should pay particular attention towards opening up its standards-setting processes to ensure that the best technologies and skills are able to enter the market.

As long as a good institutional environment exists, the market's ability to play a decisive role in efficiently allocating resources will continue to be enhanced, enthusiasm and incentives for innovation in society will be fostered, and TFP growth



will allow the economy to grow steadily. All this will no doubt lay a solid foundation for China's sustainable growth.